STATUTORY DECLARATION

I, Sun Suk KIM, a citizen of the Republic of Korea and a staff member of Y.H.KIM INTERNATIONAL PATENT & LAW OFFICE specializing in " PLASMA DISPLAY PANEL", do hereby declare that:

(1) I am conversant with the English and Korean languages and a competent translator thereof.

(2) To the best of my knowledge and belief, the following is a true and correct translation of the Priority Document (No. P1999-52535) in the Korean language already filed with Korean Industrial Property Office on November 24, 1999.

Signed this 12th day of June, 2004

Sun Suk KIM

PATENT APPLICATION

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TITLE OF THE INVENTION: PLASMA DISPLAY PANEL

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The present application is filed pursuant to Article 42 of the Korea Patent Act.

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ABSTRACTS

[Abstract]

The present invention relates to a plasma display panel.

In a plasma display panel including a lower substrate, having a plurality of barrier ribs coated with a fluorescent material and arranged in parallel and an address electrode between the barrier ribs, and a upper substrate sealed to an upper side of the lower substrate and having a transparent electrode and a bus electrode for a discharge, wherein a rear surface of the upper substrate has a light shielding part for shielding a light emission pursuant to the discharge generated at the barrier ribs positioned at the edge of the lower substrate.

Accordingly, the plasma display panel shields that light generated by a discharge is diffused to the upper substrate from non-display part, not an effective display part, thereby enhancing a contrast of a display.

[Representative drawing]

FIG. 4A

SPECIFICATION

[Title of the invention]

PLASMA DISPLAY PANEL

[Brief description of the drawings]

FIG. 1 is a disassembled perspective view showing a related art plasma display panel;

FIG. 2 is a sectional view illustrating a combined plasma display panel of FIG. 1;

FIGs. 3A and 3B are diagrams illustrating an effective display part and a non-display part; and

FIG. 4 is a disassembled perspective view of a plasma display panel incorporating a light shielding part of the present invention.

<Detailed description of the reference numerals>

10 and 20 : an upper substrate and a lower substrate

11 : a sustaining electrode

11a : a transparent electrode

11b : a bus electrode

12 : an upper dielectric layer

13 : protective film

21 : a barrier rib

30 : a light shielding part

[Detailed description of the invention]

[Object of the invention]

[Technical field including the invention and prior art therein]

The present relates to a plasma display panel, and more particularly, to a plasma display panel capable of shielding that light generated by a discharge is diffused to the upper substrate from non-display part not an effective display part.

In recent, a development of a high definition television has been partially completed. During a research progress for an improved scheme of the high definition television, an importance for a picture display device (or an image display device) has been remarkably raised. As known in the art, the picture display device includes a cathode ray tube (CRT), a liquid crystal display (LCD), a fluorescent display device (VFD) and a plasma display panel (PDP).

However, since the display devices do not satisfy the requirement of the high definition television, the picture display devices have been developed with a correlation in separate technical fields.

Among these picture display devices, the PDP displays a picture by using a gas discharge and is used for a television, a monitor and an internal or an external advertising display device because it has properties such as a high resolution, an illumination ratio, and a rapid response speed as well as a suitability of displaying a large-scale picture.

FIGs. 1 and 2 illustrate a disassembled perspective view of a related art plasma display panel and a combined section view of the related art plasma display panel shown in FIG. 1, wherein a lower substrate shown in FIG. 2 shows a state that an upper substrate is rotated by an angle of 90°.

That is, in the plasma display panel, an upper substrate 10, which is a display surface for displaying a picture, is combined to a lower substrate 20 spaced by a designated distance in parallel each other.

A lower portion of the upper substrate 10 includes a sustaining electrode 11 for sustaining a light emission of a cell by a mutual discharge in one pixel. That is, the sustaining electrode 11 includes a couple of a transparent electrode (or a ITO electrode) 11a and a bus electrode 11b. The transparent electrode 11a is made of a transparent ITO

and the bus electrode 11b is made of metallic material. The sustaining electrode 11 is covered with an upper dielectric layer 12 that serves to limit a discharge current and insulate the pair of electrodes from each other. On an upper surface of the upper dielectric layer 12, a protective film 13 is formed.

On the lower substrate 20, barrier ribs 21 of a stripe type for forming a plurality of discharge spaces, i.e., a plurality of discharge cells, are arranged in parallel, and a plurality of address electrodes 22 is arranged in parallel to the barrier ribs 21 and performs an address discharge at an area intersecting the sustaining electrode 11 to generate a vacuum violate ray.

An upper surface of the lower substrate is applied with R, G, and B fluorescent materials 23 radiating visible rays for a picture display in an area except an upper surface of the barrier rib 21 at the time of the address discharge.

A process of displaying the picture of the related art PDP having a configuration as described above will be explained as follows.

If a voltage of 150V ~ 300V is supplied to the sustaining electrode 11 and the address electrode 22 in a certain discharge cell, then a writing discharge is occurred within the cell positioned between the sustaining electrode 11 and the address electrode 22, and a wall charge is formed an inside surface of a discharge space of the discharge cell.

Thereafter, if a sustaining discharge voltage is supplied to the sustaining electrode 11, then a sustaining discharge is easily occurred by the wall charge, formed at the address discharge, between the address electrode 22 and the sustaining electrode 11, and a light emission of the cell occurring the writing discharge is maintained during a designated time period.

That is, an electric field is generated in the cell by

the discharge between the electrodes, which causes to accelerate a very small amount of electrons in discharge gases. These accelerated electrons collide with neutral particles of the discharge gases. By these collisions, the neutral particles are ionized into electrons and ions. The ionized electrons make another collision with the neutral particles and thus the neutral particles are rapidly ionized into electrons and ions to be a plasma state and, at the same time, to generate vacuum ultraviolet rays.

These vacuum ultraviolet rays excite the fluorescent materials 23 to generate visible lights. The generated visible lights are radiated externally through the upper substrate 10, so the light emission from the discharge cell can be recognized at exterior as displayed pictures.

Thereafter, if a discharge voltage of more than 150V is supplied to the sustaining electrode 11, then a sustaining discharge is occurred between the sustaining electrodes 11 in the cell, and a light emission from the cell is maintained during a designated time period.

However, the plasma display panel exhibits a problem as follows.

As described above, the sustaining electrode 11, including the transparent 11a and the bus electrode 11b, is extended in parallel up to an outer region of the barrier rib 21 positioned at the edge of the lower substrate 20. Due to such a configuration, a discharge occurs by the discharge voltage supplied to both ends of the sustaining electrode 11 at all regions where the sustaining electrode 11 exists.

However, the discharge occurs much more in a part without having the fluorescent materials 23 and a part without having the barrier rib 21 (or a non-display part, not an effective display part).

Thus, as shown FIGs. 3A and 3b, in the configuration that the sustaining electrode is extended up to an outer region of the barrier rib, i.e., an unnecessary non-display

part positioned at the outermost edge of the lower substrate, not an effective display part to be light-emitted by a discharge, there occurs a problem that the discharge generated at the region of the sustaining electrode and the light emitted pursuant to the discharge are diffused at the non-display part and are diffused to the outer region of the upper substrate.

In addition, since the light emitted by the generated discharge as described above is diffused at the non-display part, not the effective display part, there is a problem that a contrast is deteriorated. As a result, a reliance of production is lowered.

[Technical Subject Matter to be solved by the Invention]

Accordingly, it is an object of the present invention to provide a plasma display panel capable of enhancing a contrast of a displayed image by shielding the diffusion of the light at the non-display part even though the light emission by the discharge in the region of the sustaining electrode region extended up to the outer region of the barrier rib positioned at the edge of the lower substrate, not an effective display part, of the plasma display panel, is generated.

[Configuration and Operation of the Invention]

In order to achieve these and other objects of the invention, the present invention provides a plasma display panel including a lower substrate, having a plurality of barrier ribs coated with a fluorescent material and arranged in parallel and an address electrode between the barrier ribs, and a upper substrate sealed to an upper side of the lower substrate and having a transparent electrode and a bus electrode for a discharge, wherein a rear surface of the upper substrate has a light shielding part for shielding a light emission pursuant to the discharge generated at the barrier ribs positioned at the edge of the

lower substrate.

In a first embodiment, it is preferable that the light shielding part is formed as a black matrix arranged adjacent to the barrier ribs positioned at the edge of the lower substrate.

In a second embodiment, it is preferable that the black matrix is formed adjacent to at least one sides of the barrier ribs positioned at the edge of the lower substrate.

In a third embodiment, it is preferable that the black matrix is formed adjacent to the entire regions of the barrier ribs positioned at the edge of the lower substrate.

These and other objects of the invention will be apparent from the following detailed description of the embodiments of the present invention with reference to the accompanying drawings.

For the sake of simplicity, elements identical to those in the related art will be assigned by the same reference numerals.

FIGs. 4A to 4C illustrate a disassembled perspective view of a plasma display panel according to the embodiment of the present invention, a plan view of a combined plasma display panel, and a front view of the combined plasma display panel, respectively.

As shown in FIGs. 4A to 4C, a plasma display panel according to the present invention includes an upper substrate 10 and a lower substrate 20 which are combined in parallel by a designated distance.

A sustaining electrode 11 is arranged on a lower portion of the upper substrate 10. The sustaining electrode 11 includes a transparent electrode 11a and a bus electrode 11b for sustaining an emission of a cell.

The sustaining electrode 11 is covered with an upper dielectric layer 12 and a protective film 13 formed through a firing process. The lower substrate 20 is installed on a lower portion (or a rear portion) of the sustaining

electrode 11. Such a configuration is almost identical to those of the related art plasma display panel as described above.

According to the present invention, the light shielding part 30 is formed on a rear surface of the upper substrate 10 for shielding light emitted pursuant to a discharge generated at the barrier rib 21 positioned at the edge of the lower substrate 20.

In the first embodiment, it is preferable that the light shielding part 30 is formed as the black matrix arranged adjacent to the barrier rib positioned at the edge of the lower substrate 20.

In the second embodiment, it is preferable that the black matrix is formed adjacent to at least one side of the barrier rib 21 positioned at the edge of the lower substrate 20.

In the third embodiment, it is preferable that the black matrix is formed adjacent to the entire region of the barrier rib 21 positioned at the edge of the lower substrate 20.

An operation of the present invention having the configuration will be described as follows.

If a voltage of 150V ~ 300V is supplied to the sustaining electrode 11 and the address electrode 22 in a discharge cell, then a writing discharge is occurred in the cell positioned between the sustaining electrode 11 and the address electrode 22, and a wall charge is formed at an inside surface of the discharge space of the cell.

Thereafter, if a sustaining discharge voltage is supplied to the sustaining electrode 11, then a sustaining discharge is easily occurred by the wall charge, formed at the address discharge, between the address electrode 22 and the sustaining electrode 11, and a light emission of the cell occurring the writing discharge is maintained during a designated time.

That is, an electric field is generated in the cell by

the discharge between the electrodes, which causes to accelerate very small amount of electrons in discharge gases. These accelerated electrons collide with neutral particles of the discharge gases. By these collisions, the neutral particles are ionized into electrons and ions. The ionized electrons make another collision with the neutral particles and thus the neutral particles are rapidly ionized into electrons and ions to be a plasma state and, at the same time, to generate vacuum ultraviolet rays.

These vacuum ultraviolet rays excite the fluorescent materials 23 to generate visible lights. The generated visible lights are radiated externally through the upper substrate 10, and the light emission of the discharge cells can be recognized at an exterior as displayed pictures.

Thereafter, if a discharge voltage of more than 150V is supplied to the sustaining electrode 11, then a sustaining discharge is occurred between the sustaining electrodes 11 in the cell, and a light emission of the cell is maintained during a designated time. Such operations are identical to those of the related art plasma display panel as described above.

However, in the light shielding part according to the present invention, even though the discharge and the light emitted pursuant to the discharge are generated at the outer region of the barrier rib 21, that is, at the sustaining electrode 11 protruded to the outer region of the effective display part, the emitted light does not diffused to an exterior through the upper substrate 10.

More specifically, in such a configuration that the light shielding part 30 is formed to shield the light emitted through both sides facing each other or through the entire region at the upper substrate adjacent to the barrier rib 21 installed at the edge of the lower substrate 20, even though the light is generated by the discharge at the sustaining electrode 11 protruded to the outside of the barrier rib 21, the black matrix functioning as the light

shielding part 30 does not diffuse the emitted light to the exterior of the upper substrate 10 but shield the emitted light.

Thus, even though the light emitted by the discharge is generated at the outer region of the barrier rib, that is, at the non-display part positioned at the lower substrate 20, not the effective display part, the light shielding part 30 shields the light emitted by the discharge and diffused through the upper substrate.

As described above, the related art has a problem that a light emitted by a discharge is diffused in a non-display part positioned at the edge of a lower substrate, not an effective display part, which entails a deterioration of a contrast of a displayed image. However, according to the present invention, it is possible to solve the problem deteriorating a contrast of a displayed image by providing the light shielding part.

[Effect of the Invention]

As described above, the present invention is capable of enhancing a contrast of a displayed image by shielding light being emitted and then diffused to a non-discharge part, not an effective display part, even though the light generated by the discharge is emitted at a non-display part.

Although the present invention has been explained by the embodiments shown in the drawings described above, it should be understood to the ordinary skilled person in the art that the invention is not limited to the embodiments, but rather that various changes or modifications thereof are possible without departing from the spirit of the invention. Accordingly, the scope of the invention shall be determined only by the appended claims and their equivalents.

[What is claimed is:]

1. A plasma display panel including a lower substrate, having a plurality of barrier ribs coated with a fluorescent material and arranged in parallel and an address electrode between the barrier ribs, and a upper substrate sealed to an upper side of the lower substrate and having a transparent electrode and a bus electrode for a discharge, wherein a rear surface of the upper substrate has a light shielding part for shielding a light emission pursuant to the discharge generated at the barrier ribs positioned at the edge of the lower substrate.

2. The plasma display panel according to claim 1, wherein the light shielding part is formed as a black matrix arranged adjacent to the barrier ribs positioned at the edge of the lower substrate.

3. The plasma display panel according to claim 2, wherein the black matrix is formed adjacent to at least one sides of the barrier ribs positioned at the edge of the lower substrate.

4. The plasma display panel according to claim 2, wherein the black matrix is formed adjacent to the entire regions of the barrier ribs positioned at the edge of the lower substrate.

FIG.1

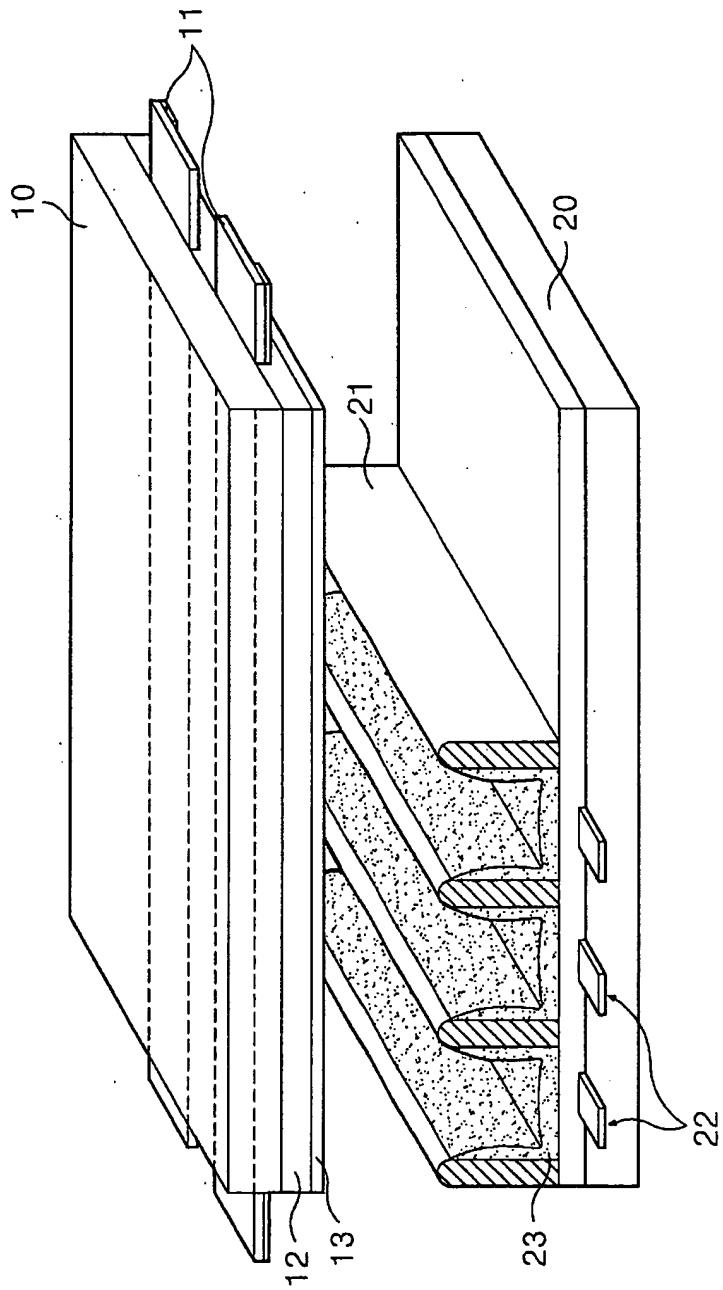

FIG.2

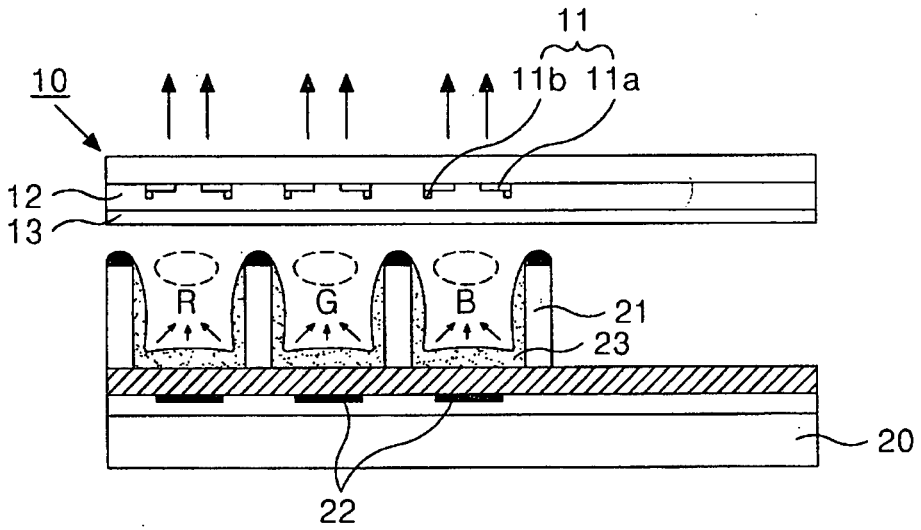

FIG.3A

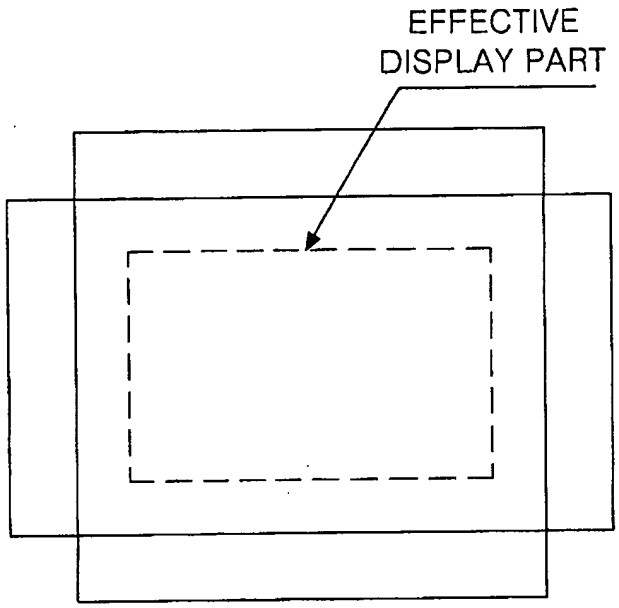

FIG.3B

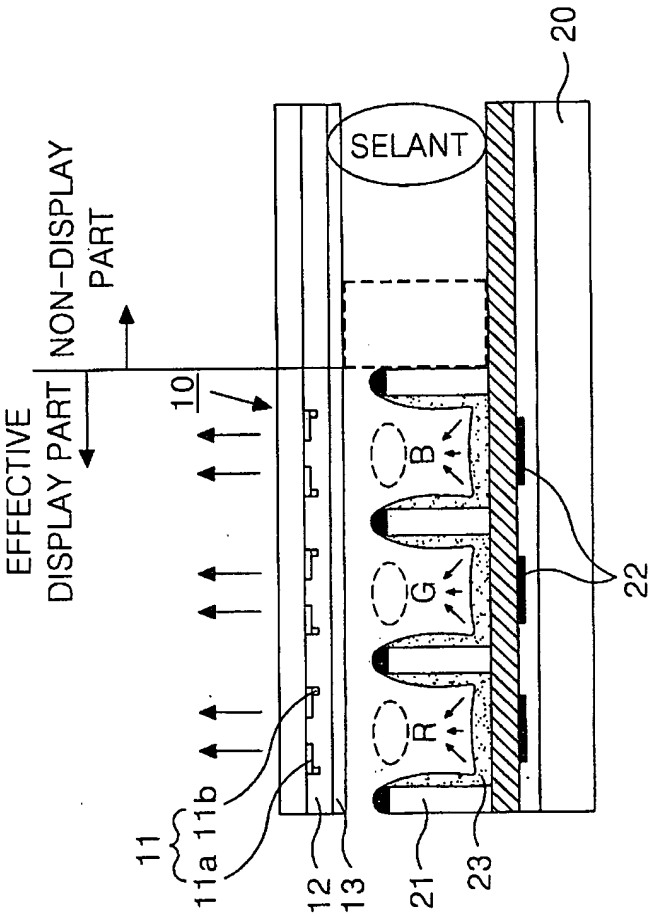
20
SELANT
NON-DISPLAY PART
EFFECTIVE DISPLAY PART
10
B
G
R
22
11
11a 11b
12
13
21
23

FIG. 4A

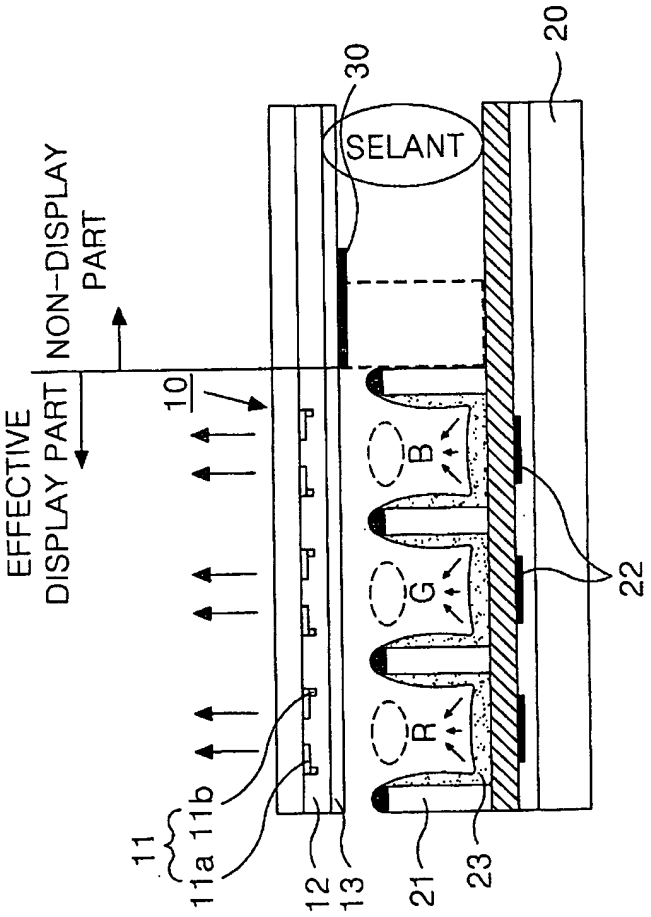
EFFECTIVE DISPLAY PART
NON-DISPLAY PART
10
30
SELANT
20
B
G
R
22
11
11a 11b
12
13
21
23

FIG.4B

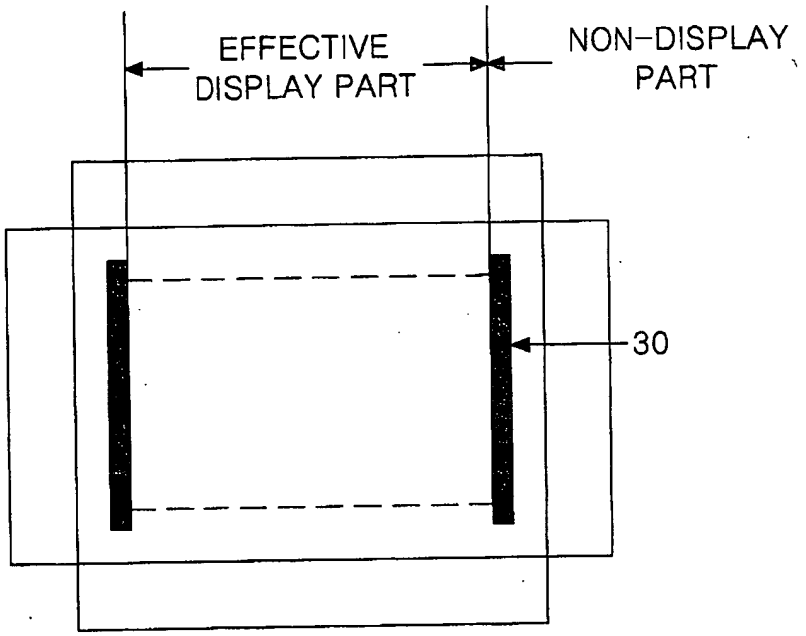

FIG.4C